The Influence of Lubricating Material on the Wear of Ball
Bearings   65-58-4-5/12

oil were tested at temperatures of 10- 60°C. 5% of
quartz dust (size = 20 - 30 mk) was added to the lubri-
cant (Fig.5). The experiments were carried out for 5
hours at 1400 revolutions/minute, and the temperature of
the lubricant = 20°C. Fig. 7 shows the decrease of ash
formation of the oil in relation to the rate and duration
of the wear of the ball bearing. It was found that the
wear, at a given concentration and dispersion of the
abrasive, is considerably lower when non-viscous lubri-
cants (oils) are used than for viscous lubricants. This
is due to the sedimentation of the abrasive particles
in non-viscous oils. When viscous oils are used at
increased temperatures, the abrasive wear depends on the
dispersion and concentration of the abrasive in the lubri-
cant, and on the friction caused by the abrasive granules
during the movement of the bearings. There are 5 Figures
and 5 References:- 1 English, 4 Russian.

Card 3/3

1. Ball bearings-Lubrication   2. Ball bearings-Performance
3. Lubricating oils-Test results   4. Lubricating oils-Test
    methods   5. Lubricating oils-Testing equipment

AUTHOR: Vinogradov, G. V. (Moscow)   SOV/24-58-4-28/39

TITLE: On the Temperature Method of Evaluating the Lubrication
             Properties of Oils (O temperaturnom metode otsenki
             smazochnoy sposobnosti masel)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh
             Nauk, 1958, Nr 4, pp 138-140 (USSR)

ABSTRACT: In recent years friction test machines with "point"
             contact surface of the rubbing pairs have been applied
             for evaluating the lubrication properties of oils,
             particularly 4-ball friction machines. In the IMASh
             AN SSSR Wear Resistance Laboratory a new method was
             evolved for evaluating the lubrication properties of
             oils on 4-ball instruments, which has been described
             in a number of papers published by Krushchov, M.M.
             and Matveyevskiy, R. M. (Refs 1-4).   Now that
             R. M. Matveyevskiy (Ref 4) has published a monograph
             on that problem it is timely to subject it to an
             exhaustive critical evaluation. A general limitation
             of the method is the fact that this method enables
Card1/4   determining the conditions of appearance of seizing
             but does not yield information on the process of its

SOV/24-58-4-28/39

On the Temperature Method of Evaluating the Lubrication
Properties of Oils

development, i.e. the intensity of its development,
the ease or difficulty of stopping seizing, etc.
This is due to the point of view that when seizing
occurs there is a transition to dry friction of metals
(Ref 4, pp 86 and 90) and only after intensive wear,
which is accompanied by a drop in the specific pressure,
"will the lubricant again gain access between the
rubbing surfaces" (Ref 4, p 91). This is in reality
not the case, as can be seen from data of Matveyevskiy
entered in Fig 8 of his monograph. These data, which
are in qualitative agreement with the observations of
the author of this paper, show that the intensity of
wear during seizing can vary greatly with the lubricating
materials used. For certain low viscosity lubricants
two critical seizing loads can be observed (Ref 8);
a lower critical regime and a higher one, whereby the
higher frequently ends up with a welding together of
the rubbing surfaces. The best proof that seizing
does not represent dry friction of metals is the here

Card2/4

SOV/24-58-4-28/39

On the Temperature Method of Evaluating the Lubrication
Properties of Oils

quoted data of Matveyevskiy and those of Vinogradov
et al. (Ref 7), from which it can be seen that the rate
of wear during seizing is higher in presence of
petroleum lubricants than in the case of dry friction.
The method of determination of the limit lubricating
capacity of oils is associated with the here mentioned
assumption of occurrence of dry friction during seizing.
The occurrence of seizing is evaluated on the basis of
the magnitude of the friction coefficient and,
according to Matveyevskiy, a correlation exists between
the changes in the friction coefficient and the rate of
wear on reaching critical temperatures. However, this
correlation is a qualitative and not a quantitative one.
The author of this critical note concludes that the
temperature method of evaluation of the lubricating
capacity of oils is interesting and promising but, at
the present stage of its development, it does not
exclude other variants of friction tests with machines
with point contacts, including the method of evaluation
Card3/4 of the anti-wear properties of lubricants from the

On the Temperature Method of Evaluating the Lubrication SOV/24-58-4-28/39
Properties of Oils

seizing loads, etc. The temperature method supplements
in an interesting manner the results obtained on 4-ball
friction machines at a number of variable test regimes
(variation during the tests of the loads, the sliding
speeds, the temperature, etc.); however, it will be
necessary to carry out special tests on 4-ball test
machines at variable friction regimes in order to
substantiate the results obtained by this method. In
view of the major difficulties of evaluating the
lubrication properties of oils containing anti-seizing
additives, it cannot be anticipated that the temperature
method will solve this problem. A large number of
specialists will have to spend more effort on developing
further this temperature method of testing.
Particularly, the Wear Laboratory of IMASh AN SSSR
should intensify its efforts in this respect.
There are 15 references, 14 of which are Soviet, 1 English.

SUBMITTED: April 13, 1957
Card 4/4

SOV/65-58-9-6/14

AUTHORS: Tsurkan, I. G; Vinogradov, G. V; Pavlovskaya, N. T,
              and Morozova, O. Ye.

TITLE: Anti-Wear Properties of Oils from Eastern Petroleum.
              (Protivoiznosnyye svoystva masel iz vostochnykh neftey).

PERIODICAL: Khimiya i Tekhnologiya Topliv i Masel, 1958, Nr. 8.
              pp. 29 - 34. (USSR).

ABSTRACT: During investigations on the useful characteristics of
              oils from Eastern petroleums, it was found that the anti-
              wear (lubricating properties) had not been studied
              sufficiently. Surface - and chemically active metals
              influence these properties to a very large degree.
              Investigations were based on results obtained by M. B.
              Borovaya on diesel oil fractions from Tuymazy, Binagadi,
              and Baku. These oils have similar viscosities, but
              different chemical composition (Table 1). Further tests
              were carried out on oils and intermediates obtained from
              the Novokuybyshevsk Petroleum Refinery. Characteristics
              of these products and their viscosities and sulphur-
              content are given in Table 2. Solutions containing sul-
              phides and disulphides in the oils were tested. Fig.1:
              friction diagrams obtained from naphthenic-paraffinic
              fractions of the oil SU. These tests showed that the
Card 1/3   viscosity of the petroleum products from the Novokuy-

Anti-Wear Properties of Oils From Eastern Petroleum.

byshevsk Petroleum Refinery only changed slightly during processing. Table 3: various methods used for evaluating the properties are compared. Fig.4: test results on the lubricating properties of structural-group composition of three diesel oils. These investigations showed that the medium viscosity products of Eastern petroleums have the highest effect. Fractions separated with the aid of isooctane show average properties. For all these aromatic products an almost horizontal line on the wear curves in the region of 60 - 70 to 90 kg loads is typical. The medium fraction, separated with isooctane, shows an optimum combination of chemically active sulphur compounds and viscosity. This investigation has made it possible to present a new method of evaluating the lubricating properties of the oils, to ascertain that during the processing of semi-goudron the lubricating property of the oily petroleum products decreases, and to find a limit in the lubricating properties of the

Card 2/3

SOV/65-58-9-6/14

Anti-Wear Properties of Oils From Eastern Petroleum.

structural components of oils which may or may not contain sulphur compounds. There are 4 Figures, 2 Tables and 4 Soviet References.

ASSOCIATION: Institut nefti AN SSSR. (Petroleum Institute, AS USSR).

1. Oils--Test results

Card 3/3

SOV/65-58-11-11/15

AUTHORS: Sinitsyn, V. V; Gol'din, S. A; Vinogradov, G. V. and Sentyurikhina, L. N.

TITLE: Electronmicroscopic Investigations of the Structure of Consistent Greases Made From Synthetic Acids (Elektronmikrosko- picheskoye issledovaniye struktury konsistentnykh smazok na sinteticheskikh kislotakh)

PERIODICAL: Khimiya i Tekhnologiya Topliv i Masel, 1958, Nr 11, pp 51 - 58 (USSR)

ABSTRACT: At present, lubricating oils and greases are made from synthetic acids which are prepared by the oxidation of paraffin. Their characteristics differ from those of lubricating oils made from edible oils, especially in their thixotropic properties, which is due to their different structures. A microscope EM-3 was used dur- ing the investigations on samples prepared according to the method described by G. V. Vinogradov (Ref.13). The samples were suspended in petroleum ether (1:200) and maintained in the solvent for a period varying from a few minutes to three months. In some cases benzene, toluene, carbon tetrachloride, dichloroethane and ethyl alcohol were used as solvents. Samples were heated to

Card 1/4   55 - 65°C when lubricants were made from synthetic acids

Electromicroscopic Investigations of the Structure of Consistent Greases Made
From Synthetic Acids

containing a small amount of unsaponified matter. An-
hydrous lithium and calcium lubricants (greases) and al-
so commercial synthetic greases were tested. Lithium and
calcium lubricants, made from individual fatty acids, were
also prepared for comparative tests. A method was
developed for investigating the structure of the sus-
pension of individual hard hydrocarbons (paraffins) in
organic solvents. White Drogobych paraffin with a mel-
ting point of $52^\circ C$ was subjected to oxidation under
laboratory conditions until the acid number equalled
70 mg KOH; this operation lasted 18 - 24 hours. The
lithium lubricants were prepared from acid fractions
of $C_{14}H_{28}O_2$ acids and from mixtures of $C_{16}H_{32}O_2$ and

$C_{18}H_{36}O_2$ acids. The calcium lubricants were prepared
from the same fractions and also from $C_{18}H_{36}O_2$ acids.
Lithium fractions had a similar structure as commercial
lubricants thickened with lithium stearate, and only
differed from the latter by the degree of dispersion
of needle-shaped soap crystallites which are formed

Card 2/4   in the dispersed phase (Figs. 1 and 2). The dispersed

SOV/65-58-11-11/15

Electronmicroscopic Investigations of the Structure of Consistent Greases Made From Synthetic Acids .

phase of calcium lubricants, thickened with soaps of synthetic acids (Figs. 3 - 5), is formed by laminar particles. Unsaponified substances influence the dimensions and forms of the original particles of the thickening agent. The flat band and laminar particles which form the structure of commercial synthetic greases (Fig.6) can be broken up easily by mechanical action. The low mechanical stability of synthetic greases is obviously influenced by the brittleness of the crystallites. The sharp difference in the structure of calcium lubricants made from synthetic acids and from edible oils explains the difference in their mechanical properties. It was also shown that anhydrous calcium lubricants, thickened with lithium stearate, have a similar structure as calcium lubricants for which synthetic acids with nearly equal molecular weight (the fraction $C_{18}H_{36}O_2$) have been used as thickening agents; the latter contained water but no unsaponified or polar compounds. A method is described for the electronmicro-

Card 3/4

SOV/65-58-11-11/15

Electronmicroscopic Investigations of the Structure of Insistent Greases Made From Synthetic Acids

photography of microcrystallites of solid paraffins crystallized out from organic solvents. There are 9 Figures, 15 References: 11 Soviet, 1 French and 3 English.

Card 4/4

Anti-Wear Properties of Lubricants and the Influence of Various
Factors on the Anti-Wear Properties of Petroleum Oils

SOV/24-58-12-17/27

alloy with 40% mercury, especially if containing 2% MoS_2
proved very effective lubricants at very heavy
loads. The friction versus time curves for mercury and
Wood's alloy lubrication of steel (Fig.3) and beryllium-
bronze (Fig.4) spheres show that a considerable time is
required for a steady state to be reached; the authors
associate this with the removal of surface oxide films.
They go on to deal with lubrication by petroleum oils.
In their experiments the non-polar naphtheno-paraffin
fractions of a bright stock of mixed Surakhansk and
Karachukhursk oils and of transformer oil were used.
The kinetics of steel wear were studied at 50 and 150°C
and sliding rates of 23 and 46 cm/sec and the effects of
loading (Fig.5), one series (curve 6) being carried out
above the critical load value. In view of the results
obtained single-minute tests were adopted. These
included tests in which various atmospheres (air,
nitrogen, oxygen, argon and superheated steam) were
provided and Fig.6 shows typical results for steel

Card 2/5

SOV/24-58-12-17/27

Anti-Wear Properties of Lubricants and the Influence of Various
Factors on the Anti-Wear Properties of Petroleum Oils

critical temperature corresponding to the critical load.
They deduce dimensionless equations and give results of
experiments in which the information on the movement of
the oil (required for applying the equations) was
obtained by following the movement of ochre particles
in the oil during a test. For treating the data the
authors used an experimental relation between the
friction coefficient and speed of sliding for sub-
critical loads (Fig.8) and they show calculated and
experimental values for the influence of the scaling
factor, speed of sliding and friction coefficient on
the critical loads (Fig.9 and table), the relations
obtained being similar to those for gears (Ref.6).
Fig.10 shows the results of the investigation of the
temperature dependence of the critical load for various
oils with 1/2" chromium ball-bearing steel balls.
Metallographic study of sections cut slantwise through
worn spots on the steel balls in the direction of
Card 4/5   sliding confirmed the expectation that at temperatures

SOV/24-58-12-17/27

Anti-Wear Properties of Lubricants and the Influence of Various
Factors on the Anti-Wear Properties of Petroleum Oils

> of the order of $200^{\circ}C$ the nature of the atmosphere was
> the main factor. The authors maintain that in
> evaluating the lubricating properties of oils the nature
> of the wear process must be taken into account and
> briefly discuss this. There are 10 figures, 1 table
> and 8 references of which 7 are Soviet and 1 English.

SUBMITTED: 7th December 1957.

Card 5/5

AUTHORS: Vinogradov, G.V., Pavlov, V.P.   69-58-2 -22/23

TITLE: The Problem of Fluidity and Stability of Structural Disperse
Systems (K voprosu o tekuchesti i prochnosti strukturirovan-
nykh dispersnykh sistem)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 2, pp 248-253 (USSR)

ABSTRACT: This article contains a discussion on problems of modern
rheology. The dependence of the shear stress on the defor-
mation of bitumens which are highly viscous, weakly elastic,
and structural disperse systems, is dealt with. Different
methods give slightly different results. The elementary ap-
paratus used for the investigations under discussion gives
reliable results only for systems with low elastic deforma-
tions and may not always be applied to rheological proces-
ses taking place in highly elastic bodies. The juxtaposi-
tion of systems with large (aluminum naphthenate gels, etc.)
and small (bitumens) elastic deformations must be met with
great caution.

Card 1/2

69-58-2 -22/2)

The Problem of Fluidity and Stability of Structural Disperse Systems

There are 4 graphs and 14 Soviet references.

SUBMITTED: July 12, 1957

1. Dispersion systems--Stability   2. Dispersion systems--Fluidity

Card 2/2

SOV-69-20-5-8/23

AUTHORS: Mdivnishvili, O.M., Vinogradov, G.V.

TITLE: A Rheological Study of the Structurized Suspensions of Bentonite and Some of its Derivatives (Reologicheskoye issledovaniye strukturirovannykh suspenziy askangelya i nekotorykh yego proizvodnykh)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol XX, Nr 5, pp 569-574 (USSR)

ABSTRACT: The mechanical properties of suspensions and pastes made from ascangel, a bentonite found in the Georgian SSR, are studied by means of an elastoviscometer $/$Ref. $4/$. The ascangel suspensions were treated with solutions of NaCl, Ca-Cl$_2$, AlCl$_3$, and monosubstituted Na-, Ca-, Al-bentonites, and mixed Na- and Ca-bentonites. The characteristics of the exchange complex of ascangel and its monosubstituted derivatives are given in a table. The limits of stability of the studied systems were determined as the highest values of the shear stress. The pastes of Ca- and Al-bentonites which were not subjected to preliminary mechanical destruction, are characterized by τ-curves with weakly pronounced maxima, which are inflexion points of the curves (Figure 1). The dependence of the limits of shear stability on the concentration of the suspensions and pastes is shown in Figure 2. The thixotropic structure formation

Card 1/2

SOV-69-20-5-8/23

A Rheological Study of the Structurized Suspensions of Bentonite and Some of its Derivatives

in water suspensions and pastes of bentonites was studied by destroying the suspensions and pastes in a field of homogeneous shear stresses in a rotary viscosimeter. The viscosity of the destroyed systems is dependent on the concentration. This dependence is represented by two intersecting curves. The point of intersection corresponds to the critical concentration of the disperse phase. There are 5 graphs, 1 table, and 6 references, 5 of which are Soviet and 1 English.

ASSOCIATION: Kavkazskiy institut mineral'nogo syr'ya (Caucasus Institute of Mineral Raw Material)

SUBMITTED: April 10, 1957

1. Bentonite--Mechanical properties

Card 2/2

SOV/32-24-10-40/70

A Friction Machine for Testing the Lubrication Properties of Petroleum
Products

loaded by a hydraulic arrangement containing a manometer of the
type MF -1. The spindle oil AU is used. The measurement of the
places of wear is carried out by means of a microscope MP.-5.
The reproducibility of the experimental results was investigated
with a petroleum paraffin fraction of the oil MS-20 according
to the one-minute method (Ref 3) at n=600 revs/min. There are
3 figures and 3 references,   which are Soviet.

ASSOCIATION: Institut nefti Akademii nauk SSSR (Petroleum Institute AS USSR)

Card 2/2

57-2-16/32

AUTHORS: Vinogradov, G. V. , Manin, V. N.

TITLE: An Investigation by Optical Polarization of the Flow Processes in Concentrated Solutions of High Polymers (Polyarizatsionno - -opticheskoye issledovaniye protsessov techeniya kontsentriro- vannykh rastvorov vysokopolimerov)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol.28, Nr 2, pp.279-286 (USSR)

ABSTRACT: The peculiarities of the viscosity-, thixotropic- and dynamo- optical properties of a concentrated solution of ethylcellulose were compared here. The results in the determination of the ex- tinction angle and the angles at double refraction well explain the nature of the thixotropic transformations in solutions of ethylcellulose. The quantitative dependence of the quantities of the double refraction and the extinction angles on the shear- ing strain and the velocity gradients is determined here. On the basis of a comparison of the rheological and the dynamoop- tical characteristics of systems which were investigated in a rotation-device with coaxial cylinders and a homogeneous poten-

Card 1/2

57-2-16/32

An Investigation by Optical Polarization of the Flow Processes in Concentrat-
ed Solutions of High Polymers

·tial field, a method for the determination . ‾ ‘he kinematics
and the dynamics of the flows of anomalous v₁ ɔus systems with
a heterogeneous potential field is suggested here. For the case
of a plane flow with a heterogeneous potential field the authors
show a good convergence in the calculation of the kinematic and
dynamic flow cross sections which were performed on the basis
of the rheological and polarization-optical measurements. There
are 6 figures, and 7 references, 6 of which are Slavic.

SUBMITTED: March 6, 1957

AVAILABLE: Library of Congress

1. Ethel cellulose-Viscosity

Card 2/2

SOV/20-122-4-30/57

The Elastic- and Strength-Properties of Plastic Dispersed Systems in Connection With the Phenomenon of Thixotropy

the revolution of the dynamometer core, an increase in g is observed because of the thixotropic restoration of the lubricant structure. Even for $n \sim 10^{-5}$ revolutions per minute, the values of g were by 10 % lower than the corresponding values found under static conditions. The coefficient of shear G and the shear strength τ_{str} depend differently on the deformation of plastic bodies. The elasticity- and the shear-strength are caused by different kinds of bonds between the particles of the dispersed phase. There are 4 figures and 4 references, 4 of which are Soviet.

PRESENTED: May 17, 1957, by A. V. Topchiyev, Academician

SUBMITTED: May 17, 1957

Card 2/2

VINOGRADOV, G. V., (SECTION V)

"Rheology of Lubricants and Oils."

Report submitted at the Fifth World Petroleum Congress, 30 May -
5 June 1959. New York.

DEYNEGA, Yu. F.; DUMANSKIY, A. V.; VINOGRADOV, G. V.; NEYMARK, I. Ye.

"The Effect of the Surface and its Modification on the Dielectric Properties of Some Disperse Systems."

report presented at the Section on Colloid Chemistry, VIII Mendeleyev Conference of General and Applied Chemistry, Moscow, 16-23 March 1959.
(Koll. Zhur. v. 21, No. 4, pp. 509-511)

PAKSHVER, E.A.; GELLER, B.E.; VINOGRADOV, G.V.

     Studying the concentrated solutions of polyacrylonitrile
     in dimethylformamide. Khim. volok. no.2:21-24 '59.
                                       (MIRA 12:9)

     1.Vsesoyuznyy nauchno-issledovatel'skiy institut iskusstvennogo
     volokna.
                   (Acrylonitrile)   (Formamide)

SOV/179-59-2-18/40

AUTHORS: Vinogradov, G.V. and Pavlov, V.P. (Moscow)

TITLE: Elastic and Strength Properties of Soft Bodies (Uprugiye i prochnostnyye svoystva myagkikh tel)

ABSTRACT: The paper consists of material delivered to the Third World Congress on Rheology, September 1958. Experiments were carried out in a rotational elasto-viscometer with concentric cylinders, the space between which was filled with the material under investigation. In some experiments, the inner cylinder was fluted, but in others it was plain. The speed of rotation could be varied from 4×10^{-7} to 1.5×10^3 rpm. The deformation was recorded automatically by means of an optical magnification device. The rotation could be started and stopped almost instantaneously, thus permitting the stress relaxation properties to be determined. The stress/deformation/time curves are given for a grease and for pastes of bentonite in water, and deformation/velocity/time curves for the grease. The dependence of shear modulus and limiting shear strength on the deformation velocity is

Card 1/2

SOV/179-59-2-18/40

Elastic and Strength Properties of Soft Bodies

also shown for the two materials. The limiting shear strength is determined from the maxima in the stress/deformation curve and occurs at deformations amounting to about 10%. Some lowering of the shear modulus, accompanied by breakdown in the material, occurs above the limiting shear strength. There are 6 figures and 7 Soviet references.

SUBMITTED: December 18, 1958.

Card 2/2

SOV/69-21-2-14/22

5(

AUTHORS: Mamakov, A.A., Tyabin, N.V., Vinogradov, G.V.

TITLE: The Application of the Similarity Theory in Calculating the
                Flowing Processes of Plastic Lubricants in Tubes (Primenen-
                iye teorii podobiya k raschetu protsessov techeniya plast-
                ichnykh smazok v trubakh)

ABSTRACT: The authors propose two methods of generalizing experiment-
                al data, and the calculation of the flow of plastic lubri-
                cants in tubes in the form of a dependency of the tube re-
                sistance coefficient on the generalized Reynolds criterium.
                The variable effective viscosity method consists in the de-
                termination of the generalized Reynolds criterium according
                to the value of the local effective viscosity for the layer
                contiguous to the tube wall. The constant parameter method
                consists in the approximation of the flow curve in the form
                of straight lines corresponding to the equations Shvedov-
                Bingham and in the determination of the generalized Reynolds
                criterium according to the parameters of the viscous-plastic

Card 1/2

SOV/69-21-2-14/22

The Application of the Similarity Theory in Calculating the Flowing Pro-
cesses of Plastic Lubricants in Tubes

flow. The application of these methods permitted a general-
ization of experimental data concerning the flow of plastic
lubricants in tubes at a change of the speed gradient from
0.03 to 35,400 sec. $^{-1}$, the length of the tubes by 250 times
and their diameters by 36 times. The authors have found an
expression of the tube resistance coefficient from the ge-
neralized Reynolds formula at the flow of plastic lubricants,
and have shown that for the calculation of loss of pressure,
the usual hydraulic calculation methods can be used. These
are based on the method of approximating curves of the flow
of plastic lubricants in rotary viscosimeters. The authors
mention the following Soviet scientists: G.V. Vinogradov,
V.P. Pavlov, V.G.Petrovskiy; N.V. Tyabin. There are 5 graphs
and 21 references, 12 of which are Soviet and 9 English.

ASSOCIATION: Khimiko-tekhnologicheskiy institut im. S.M. Kirova, Kazan'
(Chemical-Technological Institute imeni S.M. Kirov, Kazan')

SUBMITTED: May 6, 1958

Card 2/2

AUTHORS: Vin_____ ____, Lvov___, A.A., and Pavlov, V.P.
(Moscow _____)

TITLE: Experi____ ___ Investigation of an Anomalously Viscous
Body ___ _____ Stress Condition

PERIODICAL: Inve_____ Akademii nauk SSSR, Otdeleniye tekhnicheskikh
nauk, Mekhanika i mashinostroyeniye, 1959, Nr 6,
pp ___ ___ (USSR)

ABSTRACT: The paper __ a continuation of previous work (Refs 1,2,3).
The expe_____ ___ were carried out on a lubricant grease
containin __.2% spindle oil, 12% calcium soap of cotton
seed oil ___ 1.0% water. For comparison, measurements
were al__ _____ out on a high-resin extract of the
waste __ _____ual oil processing, which is a high
viscosi__ _____id with Newtonian flow characteristics.
The ex_____ ___ were made in a double rotation viscometer,
(Fig __. ___ ___draulic fluid supplied from an apparatus
of _____ __livery passed to the tube 1 with precision
mate_____ ___ to the viscometric cylinder 3 where it
exert__ __ ____ on the piston 4. The test material 5
filled __ _____der 3 and was forced by the piston 4 into
the tube __ __e flexible hose 7 and the space between the

Card
1/5

S/179/60/000/06/014/029
B031/B101

Experimental Inv... ...n of an Anomalously Viscous Body in a
Complex Stress S...

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...ernal cylinders of one of the viscometers
...tation apparatus 8, 9. The internal
... rotation viscometer was driven by
... hydraulic motor. The hydraulic drive
... hydraulic motor, hydraulic pump and oil
...llowed continuous regulation of the
... from 0.55 to 1500 rev/min controlled by
... disc 10. The moment of resistance was
... equipment 11-14, working on a
...hod. The force created by the weight 11
... by the flexible cord 12 and pulley 13 to
...inder, and compensated for the resistance
...rial in the space between the lateral
... cylinders. The load 11 was chosen so
...l cylinder of the rotation viscometer
...ry as indicated by the zero pointer 14.
... were contained in a thermostat 15,
... 15. The two coaxial viscometers were
... for the length of the rotating cylinder,
...urements in both, end effects were

Card
2/5

S/179/59/000/06/014/029
E081/E141

Experimental Investigation of an Anomalously Viscous Body in a
Complex Stress Condition

eliminated. The twisting moment was measured as a
function of rotation velocity, and at the same time an
axial flow, varying between 1.48×10^{-3} and 1.82 cm3/sec
was maintained through the viscometer. Control
experiments on the circumferential flow were carried out
in the rotation plasto-viscometer PVR-1 (Ref 3). The
system is analysed mathematically and expressions obtained
for the mean axial deformational velocity, D_{10}, the
circumferential deformational velocity, D_2, and the
deformational velocity at the wall, D_1 (Eqs 1 and the two
preceding equations). Graphs are given of log D_{10}, log D_1
and log D_2 against log r_1 and log r_2 at temperatures of
20, 35 and 50o (Figs 2, 3, 4); r_2 and r_1 are respectively
the mean and the axial tangential stresses. Examination
of the curves for the grease for the high resin extract
and for the grease preconditioned at a deformation
velocity of 5.1×10^4 sec^{-1} in a rotary homogeniser
shows that the axial and circumferential flow have
essentially the same characteristics. If the two flows
are of the same order of magnitude, there is a strong

Card
3/5

S/179/59/000/06/014/029
E081/E141

Experimental Investigation of an Anomalously Viscous Body in a
Complex Stress Condition

influence of circumferential on axial flow. At low
circumferential flows, there is practically no influence
on axial flow. At high circumferential velocities, the
axial flow of the anomalously viscous body becomes
Newtonian. Some increase in circumferential viscosity is
observed at high axial velocities. This effect
diminishes if the temperature is raised, and also if the
body is preconditioned by subjecting it to high
deformational velocities. Figure legends are as follows.
Fig 1 - Schematic arrangement of the apparatus for
investigating flow of an anomalously viscous body under
the action of two simple shears. Fig 2 - characteristic
(continuous) and neutralised (dotted) flow curves for
extract. Fig 3 - characteristic (continuous, dashed)
and neutralised (dotted) flow curves for fatty grease.
Fig 4 - characteristic (continuous) and neutralised (dotted)
flow curves for fatty grease, the structure of which was
broken down in a homogeniser at a deformation velocity
$D = 5.1 \times 10^4$ sec-1.   (In Figs 2-4 the dotted lines
represent the curves $D_{10}(\tau_1)$ obtained for extract and

Card
4/5

S/179/59/000/06/014/029
E081/E141

Experimental Investigation of an Anomalously Viscous Body in a
Complex Stress Condition

grease with axial flow in the gap of the twin rotation
viscometers. The continuous lines represent the curves
$D_2(\tau_2)$ obtained with circumferential flow of the
extract in the twin rotation viscometers, and in the
plasto-viscometer PVR-1. The units of shear are dynes/cm^2
and of deformation velocity sec^{-1}. The numbered points
on the curves are identified in the table at the top of
page 104, in which Q = axial discharge).
Fig 5 - dependence of effective axial viscosity on
circumferential deformation velocity for extract.
Fig 6 - curves of change of effective axial viscosity
with circumferential deformation velocity for fatty grease
at temperatures of 80, 65 and 20°.   Fig 7 - curves of
change of effective circumferential viscosity on
circumferential deformation velocity (viscosity (sic))
for grease.

Card   There are 7 figures, 1 table and 6 references, of which
5/5   5 are Soviet and 1 is English.

SUBMITTED: June 4, 1959

MAMAKOV, A.A.; TYABIN, N.V.; VINOGRADOV, G.V.

Graphical method for determining the distribution of flow velocities of elastic petroleum products. Izv. vys. ucheb. zav.; neft' i gaz 2 no.7:81-86 '59.   (MIRA 12:12)

1.Kazanskiy khimiko-tekhnologicheskiy institut im. S.M. Kirova.
        (Hydraulics)

TSURKAN, I.G.; VINOGRADOV, G.V.

New four-ball friction machine for evaluating the wear-resistant
properties of lubricating oils. Zav.lab. no.11:1394-1396 '59.
(MIRA 13:4)

1.Institut neftekhimicheskogo sinteza Akademii nauk SSSR.
(Lubrication and lubricants-- Testing)

5(3)

AUTHORS: Vinogradov, G. V., Kusakov, M.M., Sanin, P.I., Razumovskaya, E.A., Ul'-
yanova, A.V.

TITLE: The Interaction of Thioorganic and Thiophosphoroorganic Additions to
Oils With Metals

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol 32, Nr 5, pp 1136-1141 (USSR)

ABSTRACT: Anti-wear admixtures to oils containing sulfur-, phosphorus- and chlorine-
compounds are widely applied. The functional limits of their action is
investigated here by means of labeled atoms. They were dissolved in the
non-polar fraction of bright stock and their interaction with chromium-
manganese-silicon steel and electrolytic copper was studied. The inter-
action of steel with sulfur starts already at room temperature. The re-
action of sulfur with copper is more intense. The reactivity of di-
sulfide is higher than that of sulfide due to the higher mobility of the
sulfur atoms in the disulfide molecule. The sulfur is bound to steel and
copper irreversibly, i.e. chemically. Experiments with tributyltrithio-
phosphite labeled by P^{32} and S^{35} have shown that phosphorus reacts more
intensively with steel than sulfur. At 20°C it is bound in the amount
of 4.2 mg/cm². At 140°C and higher the decomposition of tributyltri-

Card 1/2

SOV/80-32-5-36/52

The Interaction of Thioorganic and Thiophosphoroorganic Additions to Oils With Metals

thiophosphite starts which may be regarded as the upper limit of the protective action. A film of iron phosphide is more easily formed on steel than a sulfide film. At a temperature increase sulfur reacts more intensively with copper than with steel.
There are 5 graphs, 1 table and 6 references, 5 of which are Soviet and 1 American.

SUBMITTED: January 22, 1958

Card 2/2

SOV/20-125-5-50/61

5(4), 10(4)

AUTHORS: Pavlov, V. P., Vinogradov, G. V.

TITLE: The Thermal Effect During the Motion and the Stoppage of a Flow of Anomalously Viscous Bodies (Teplovyye effekty pri techenii i ostanovke potoka anomal'no vyazkikh tel)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 5, pp 1061 - 1064 (USSR)

ABSTRACT: The processes of heat liberation in a flow are best investigated in the case of high homogeneity of the field of shearing stresses. In the present paper the thermal effects were therefore investigated by means of a rotation viscosimeter already previously described (Ref 3). The operational surfaces of the cylinder were ground. The temperature increase (ΔT) in the flow was determined with an accuracy of up to $\pm 0.005°$ by means of a differential thermocouple. The time dependence of ΔT was recorded on photographic paper by means of a mirror galvanometer and a photographic camera. A typical photograph illustrates the results obtained by experiments carried out with Newton liquids. Temperature in-

Card 1/4

SCV/??c-125-5-30/61

The Thermal Effect During the Motion and the Stoppage
of a Flow of Anomalously Viscous Bodies

creases until it becomes steady. After this is attained,
the entire energy supplied is transferred to the thermostate
in form of heat and ΔT=const holds. Next, temperature varia-
tion in the flow is investigated by analysis. The entire
specific power input N_{sp} is assumed to be transformed into
heat. One part of this power is used for heating the substance
under investigation, the other is conveyed to the thermostat.
The heat balance of the process may be expressed by the
equation

$$D^\cdot = c \frac{d(\Delta T)}{dt} + k \cdot T \cdot$$

Here c denotes the specific heat of the subject under inves-
tigation (referred to the volume), and k - the coefficient
of the heat transfer from this substance to the liquid in
the thermostat. Herefrom it follows for the slowing down of
the flow that

$$c \frac{d(\Delta T)}{dt} + k_1 \Delta T = 0.$$

Card 2/4

SOV/?o-125-5-30/61

The Thermal Effect During the Motion and the Storage
of a Flow of Anomalously Viscous Bodies

By integration of this equation

$$c \Delta T_s = -k \int_{t_0}^{t_1} Tdt = kmS_1 = E_1$$

is obtained, where m denotes a proportional factor. For the
purpose of determining the coefficient k the authors investi-
gated the dependence of ΔT_s on D. The test objects used
were Newton liquids (petroleum), plastic dispersive systems
of the type of consistent lubricants, concentrated solutions
of ethyl cellulose and aluminum naphthenate in some solvents,
as well as other substances. It was confirmed that the equation
$D \sim k \Delta T_s$ holds and that k does not depend on D and the
rheological properties of the substances to be investigated.
Next, the phenomena accompanying slowing down of a flow of
highly complicated structural systems is investigated. A dia-
gram gives data concerning the time dependence of the inte-
gral and differential thermal effects, which are typical

Card 3/4

SOV/20-125-5-30/61

The Thermal Effect During the Motion and the Stoppage
of a Flow of Anomalously Viscous Bodies

of such substances, after a sudden stoppage of flow. The
authors thank Academician V. A. Kargin for discussing this
paper and for his valuable advice. There are 3 figures,
1 table, and 3 Soviet references.

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR
(Institute for Petroleum-Chemical Syntheses of the Academy
of Sciences, USSR)

PRESENTED: January 5, 1959, by V. A. Kargin, Academician

SUBMITTED: December 17, 1958

Card 4/4

SOV/20-127-2-35/70

5(4)
AUTHORS: Vinogradov, G. V., Mamakov, A. A., Pavlov, V. P.

TITLE: The Flow of Anomalous Viscous Systems Under the Action of Two
             Pure Shearing Stresses in Mutually Perpendicular Directions

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 2, pp 362-365
             (USSR)

ABSTRACT: In the clearance between two coaxial cylinders, both an axial
             and a radial flow are possible. Thus, the possibility is given
             of comparing different forms of flow of anomalous viscous
             systems under different shearing stresses and at different
             velocity gradients in one and the same apparatus. Grease-
             "solidol" consisting of 86.2% spindle oil, 12% Ca-soaps of
             cottonseed oil, and 1.8% water, was the material used for the
             experiments. A high-viscosity Newton liquid, an extract of
             resins and polycyclic aromatic hydrocarbons from petroleum-
             distillation residues, served as control liquid. The measure-
             ment was made in a system with two rotary viscosimeters with
             coaxial cylinders, differing by the size of the cylinders'
             working surfaces. Concerning the shearing stress for axial
             flow it holds according to references 3 - 5 :

Card 1/4

The Flow of Anomalous Viscous Systems Under the
Action of Two Pure Shearing Stresses in Mutually Perpendicular Directions

$$\tau_{ax} = \Delta p \frac{H}{2L}$$ (Δp = pressure drop per unit of length of
the cleft in axial direction, H = cleft width, L = length of
cylinder surface). For the velocity gradient it holds:

$$\overline{D}_{ax} = Q(2\pi RH^2)^{-1}$$ (Q = amount of flow, R = radius of the inner
cylinder). Checking revealed that the method applied yielded
well reproducible results. Experimental results with "solidol"
are shown in logarithmic coordinates in figure 1. Table 1
contains the values for $\overline{D}_{ax}$. With simultaneous axial and radial
flow, Δp and the moments of resistance are measured at
different D_{rad} (Fig 2). Curves 1 show the flow in the case of
a purely axial flow (D_{rad} = 0), curves 2 - 7 show the
dependence $\overline{D}_{ax}(\tau_{ax})$ for given D_{rad}. In the case of a
homogeneous shearing stress field all over the clearance, the
radial flow brings out a destruction of the structure and
transforms the plastic body into an anomalous-viscous liquid.

Card 2/4

SOV/20-127-2-35/70

The Flow of Anomalous Viscous Systems Under the Action of Two Pure Shearing Stresses in Mutually Perpendicular Directions

The higher D_{rad}, the lower becomes viscosity. Hence, at given D_{ax} with rising D_{rad} the shearing stress τ_{ax} drops, whereas at given τ_{ax} with rising D_{rad} also D_{ax} increases strongly. In the case of a radial flow the plastic systems were found capable of flowing out axially under the action of much lower pressures, as compared to the absence of a radial flow. A remarkable fact is that in the case of low τ_{ax} there is a direct proportionality between D_{ax} and τ_{ax}. If D_{ax} is very large as compared to D_{rad}, and assuming high temperatures, The effect of the radial flow becomes unimportant. The effect of the axial flow on the radial is shown in figure 3. Figure 4 depicts the superposition of τ_{rad} and τ_{ax}. In the case of a combined shear the flow curves lie in a fork which is formed by the curves of the purely radial and

Card 3/4

The Flow of Anomalous Viscous Systems Under the   SOV/20-127-2-35/70
Action of Two Pure Shearing Stresses in Mutually Perpendicular Directions

        purely axial flow. The authors thank Academician V. A. Kargin
        for advice. There are 4 figures, 1 table, and 7 references,
        6 of which are Soviet.

ASSOCIATION: Institut neftekhimicheskogo sinteza Akademii nauk SSSR
        (Institute of Petroleum-chemical Synthesis of the Academy of
        Sciences, USSR)

PRESENTED: March 2, 1959, by V. A. Kargin, Academician

SUBMITTED: March 21, 1959 (sic)

Card 4/4

GUT'YAR, Ye.M., prof., doktor tekhn.nauk; otv.red.; D'YACHKOV, A.K.,
prof., doktor tekhn.nauk, otv.red.; VINOGRADOV, G.V., prof.,
doktor khim.nauk, otv.red.; KLEBANOV, M.Ya., red.izd-va;
GUS'KOVA, O.M., tekhn.red.

[Hydrodynamic theory of lubrication. Sliding supports.
Lubrication and lubricants] Gidrodinamicheskaia teoriia
smazki. Opory skol'zheniia. Smazka i smazochnye materialy.
Moskva, Izd-vo Akad.nauk SSSR, 1960. 422 p. (Trudy Vse-
soiuznoi konferentsii po treniiu i iznosu v mashinakh, no.3)
(MIRA 14:1)

1. Vsesoyuznaya konferentsiya po treniyu i iznosu v mashinakh.
3d, 1958.
    (Lubrication and lubricants)   (Rheology)

VINOGRADOV, C.V.

report presented at the 1st All-Union Congress of Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb '60.

VINOGRADOV, G. V.

"Fundamentals of extreme pressure lubrication."

report to be submitted at Gordon Research Conferences - New London, New Hampton, and Meriden, N.H., 13 June-2 Sep 60.

Institute of Petroleum, USSR Academy of Sciences.

S/183/60/000/02/14/025
B004/B005

AUTHORS: Koretskaya, A. I., Konstantinov, A. A., Vinogradov, G. V.

TITLE: An Apparatus for Determining the Viscosity of Polyamide Resin Melts

PERIODICAL: Khimicheskiye volokna, 1960, No. 2, pp. 36 - 39

TEXT: The authors describe a variation of the recording viscosimeter of the type AKV-2. Because of the high viscosity of polyamide resin melts, discharge is not through a capillary tube but through a concentric slit. The melt is pressed through the slit by means of a spring-loaded piston. To prevent oxidation, the viscosimeter is filled with nitrogen. Fig. 1 shows a diagram of the apparatus, Fig. 2 the component parts made of stainless steel, and Fig. 3 a total view. Figs. 4 and 5 show experimental results obtained with caprone resin in the form of graphs. There are 5 figures and 10 references, 5 of which are Soviet.

ASSOCIATION: VNIIV (All-Union Scientific Research Institute of Synthetic Fibers; Koretskaya, A. I.; Institut neftekhimicheskogo sinteza AN SSSR (Institute of Petroleum-chemical Synthesis of the AS USSR) Konstantinov, A. A., Vinogradov, G. V.

Card 1/1

VINOGRADOV, G.V.; MANIN, V.N.

Rheological properites of concentrated polymer solutions.
Vysokom. soed. 2 no. 3:329-336 Mr '60.   (MIRA 13:11)

1. Institut neftekhimicheskogo sinteza AN SSSR.
        (Polymers)   (Cellulose)

86144

S/152/60/000/002/001/002
B023/B060

15.6000

AUTHORS: Bezborod'ko, M. D., Vinogradov, G. V., and Pavlov, V. P.

TITLE: Effect of Lubricants and Anti-wear Additives Upon the Abrasion Wear of Metals in Sliding Friction

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, 1960, No. 2, pp. 73-79

TEXT: The authors wanted to clarify the effect of lubricants and anti-wear agents upon the abrasion wear of metals in sliding friction. Tests were conducted on a four-ball friction machine (Ref. 6) with balls 12.7 mm in diameter made of ШX6 (ShKh6) steel and X18 (Kh18) stainless steel. The steel hardness was 832 kg/mm² and 657 kg/mm², respectively. The rubbing speed was 21 cm/sec. ШX6 (ShKh6) steel balls 9.52 mm in diameter were tested with V. P. Pavlov's sliding machine (Ref. 7). The sliding rate in this case amounted to 41.5 cm/sec. The tests were conducted at room temperature by the "one-minute" method. The balls were first subjected to stress, and the machine was then started. The abrasive agents used were electrocorundum micropowders M7(M7), M10(M10), M14(M14), and M28 (M28).

Card 1/3

86144

Effect of Lubricants and Anti-wear Additives   S/152/60/000/002/001/002
Upon the Abrasion Wear of Metals in Sliding   B023/B060
Friction

and boron carbide micropowders M3(M3), M5(M5), and M7(M7), produced at
the Petergofskiy chasovoy zavod (Petergof Watch Factory). The size of the
micropowder particles conformed with ГОСТ 3258-46 (GOST 3258-46), and in
the case of electrocorundum particles it was correspondingly 7-5, 10-7,
14-10, and 28-20μ. The boron carbide particles were correspondingly 3-5,
5-3, 7-5μ large. The mentioned micropowders contained 60-70% main fraction.
Mica or silica gel of at most 14μ were introduced in some of the tests.
The micropowders were all added to the lubricants while stirring. The
lubricants used were mixtures of plastic lubricants with oils of medium
viscosity or with naphthene-paraffin fractions. AУ (AU) and МС-14 (MS-14)
oils were used as the liquid hydrocarbon media. Dibenzyl sulfide as an
anti-wear substance was added to the mixtures in an amount of 2.46 percent
by weight. The results obtained by the authors from their tests are in
agreement with observed wear resistance of the sulfidized rubbing surface
in the presence of abrasives (Ref. 7). It may be seen from Fig. 4 that in
all cases the introduction of dibenzyl sulfide reduces friction in the
gripping period. The authors were able to establish that the specific
effect of the abrasive in the lubricants is to a large extent dependent

Card 2/3

86144

Effect of Lubricants and Anti-wear Additives   S/152/60/000/002/001/002
Upon the Abrasion Wear of Metals in Sliding   B023/B060
Friction

both upon the nature of the metal forming the body subjected to friction
and on the composition of the lubricants. As the friction coefficients
increase in the presence of abrasives, the anti-wear effect of sulfur
compounds also increases. In other words, plastic sulfides are formed by
the sulfur compounds on the friction area with gripping of the latter,
whereby the real contact area of friction is increased, which in its turn
causes a reduction in the intensity of the initial gripping process. There
are 4 figures and 9 references: 7 Soviet and 2 US.

ASSOCIATION: Voyennaya ordena Lenina akademiya bronetankovykh voysk im.
               I. V. Stalina (Military "Order of Lenin" Academy of
               Armored Tank Troops imeni I. V. Stalin)

SUBMITTED: August 6, 1959

Card 3/3

S/152/60/000/003/003/003
B023/B060

AUTHORS: Vinogradov, G. V., Mamakov, A. A., Pavlov, V. P.

TITLE: Homogenization and Rheological Properties of Plastic (Consistent) Lubricants

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, 1960, No. 3, pp. 81-88

TEXT: The first author has pointed out in a previous paper that the majority of industrial lubricants are micrograined systems (Ref 1). In the study under consideration, the authors set themselves the following tasks: 1) to work out a colloid mill, where lubricants can be subjected to an intense homogenation under rigorously defined conditions; 2) to study the rheological properties of typical industrial lubricants. The test objects were lubricant 201 (ГОСТ 6267-52)(GOST 6267-52) and grease УСс-2 (USs-2) ГОСТ 4366-50 (GOST 4366-50). The rheological properties of fresh and homogenized lubricants were intercompared. The determination was carried out by a plastoviscosimeter (Ref. 8). The temperature was 20 ± 1°. Fig. 1 shows the scheme and the construction of the homogenizer which is

Card 1/4

Homogenization and Rheological Properties
of Plastic (Consistent) Lubricants

S/152/60/000/003/003/003
B023/B060

thoroughly described along with the working principle. Homogenation was
performed with an axial feed of lubricant of $2.5 \cdot 10^{-3}$ cm^3/sec and a
deformation rate of $5.25 \cdot 10^5$ (lubricant 201) and $3.27 \cdot 10^5$ (synthetic
grease). Phenomena of hysteresis are observed to be common to all fresh
(non-homogenized) lubricants in the study of viscosity, the deformation
rate varying considerably. Successive increase and decrease of the
deformation rate leads in graphical representation to noncoinciding flow
curves. The study of homogenized lubricants revealed two types. To the
first belongs lubricant 201. Lubricants of this type are intensively
destroyed under the action of high deformation rates. Their rheological
properties are changed irreversibly. The results obtained from the study
of the viscosity of lubricant 201 are in agreement with the determination
of the limit values of durability (Table 1), which do not change after the
lubricant has been allowed to "rest", either. Lubricants of the 201 type
distinguish themselves especially by their microcrainiThe. When sub-
jected to an intense homogenation they excel by stable, rheological
properties which do not change with time and are not affected by mechanical
actions, provided the intensity of such actions is lower than that of
homogenation. The synthetic grease US$_3$-2 belongs to the second type. Here

Card 2/4

Homogenization and Rheological Properties
of Plastic (Consistent) Lubricants

S/152/60/000/003/003/003
B023/B060

one may observe, besides irreversible changes, also such of lubricant
properties with time. In addition, also phenomena of hysteresis appear here
after an intense mechanical action. The principal characteristic is,
however, that these lubricants, when intensively homogenized, may be
regarded as Newton's liquids. The viscosity of these lubricants does not
depend upon the length of the "resting" period. Table 1 shows the change of
the limit values of durability for both types with time. The differences
between the lubricants of the first and the second type are interrelated
with the differences in the structure of the disperse phase. The decisive
factor, however, is the coarse-grained structure of the 201 lubricant.
This structure accounts for the irreversibility of the changes of
rheological properties. The inability of grease US_8-2 to restore its
rheological properties after "resting" is to be explained by the fact that
particles of the disperse phase of a colloidal dimension are present in
grease. There are 3 figures, 2 tables, and 9 Soviet references.

ASSOCIATION: Kazanskiy khimiko-tekhnologicheskiy institut im. S.M. Kirova
                (Kazan' Institute of Chemical Technology imeni S. M. Kirov)

Card 3/4

Homogenization and Rheological Properties
of Plastic (Consistent) Lubricants

S/152/60/000/003/003/003
B023/B060

SUBMITTED: July 28, 1959

Card 4/4

VINOGRADOV, G V.

S/179/60/000/02/009/032
E081/E241

AUTHORS: Vinogradov, G. V., Mamakov, A. A,, and Tyabin, N. V.
             (Moscow)

TITLE: Flow of Anomalously Viscous Bodies Under Complex Stress
             Conditions

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh
             nauk Mekhanika i mashinostroyeniye, 1960, Nr 2,
             pp 65-69 (USSR)

ABSTRACT: A continuation of previous work (Refs 5, 6, and 7). Data
           are given of experimental investigations into the flow
           of a residual extract (highly viscous Newtonian fluid)
           and a lubricant grease (anomalously viscous body) to
           verify the generalized flow law under the combined action
           of two simple shears. The data were obtained by simul-
           taneous measurements with a double rotation viscometer
           (Ref 6) and a capillary viscometer with constant outflow
           (Ref 7). The methods and basic experimental results
           are given in Ref 5. Complex shear conditions were
           realised by the combined action on the body contained
           in the space between two cylinders, of an external
           pressure and a twisting moment, the latter being obtained
           by rotation of the outer cylinder. In this way, axial

Card 1/5

S/179/60/000/02/009/032
E081/E241

Flow of Anomalously Viscous Bodies Under Complex Stress Conditions

and circumferential flow are superimposed and the particles
of the anomalously viscous body move in screw trajectories
ab (Fig 1: Scheme of screw flow of grease in a
narrow annular space). The generalized equation of
flow is written in the form (1) (Ref 8), and in
cylindrical co-ordinates r, φ, z, the quantities
p_i and $\dot{e}_i$ are written in the forms (2) and (3). (The
dot over $\dot{e}_i$ denotes differentiation with respect to time).
p_i is the intensity of shear stress, $\dot{e}_i$ the intensity
of deformation velocity, η_i the effective viscosity
coefficient, p_{rr}, $p_{\varphi\varphi}$, p_{zz} are normal stresses,
$\dot{e}_{rr}$, $\dot{e}_{\varphi\varphi}$, $\dot{e}_{zz}$ are volume deformation velocities,
$\dot{e}_{r\varphi}$, $\dot{e}_{\varphi z}$, $\dot{e}_{zr}$ are shear deformation velocities. For
the present conditions, (2) and (3) reduce to (4) and
(5) with the effective viscosity in complex shear,
axial shear and circumferential shear given by (6), (7)
and (8), respectively. The shear stresses for pure-axial
shear τ_1 and pure circumferential shear τ_2 are given
by the first equations, p 67, where Δp is the difference
in pressure between the ends of the annular space,

Card 2/5

S/179/60/000/02/009/032
E081/E241

Flow of Anomalously Viscous Bodies Under Complex Stress Conditions

H and L are the width and length of the space, M is the twisting moment, R_1 and R_2 are respectively the external and internal radii of the cylinders $(H = R_1 - R_2)$. The mean deformation velocities in axial shear D_{10} and circumferential shear D_2 are found from the second equation, p 67, and the axial deformation velocity at the wall from the third equation, where Q is the outflow per second, ω the angular velocity of the rotor. Figs 2 and 3 show log η_1 log η_2 and log η_i plotted against log D_1, log D_2 and log D_i for the extract. [Fig 2. Dependence of effective viscosity (axial, circumferential and spiral flow) on velocity gradient and intensity of deformation velocity for the extract] and for the grease [Fig 3. Dependence of effective viscosity (axial, circumferential and spiral flow) on velocity gradient and intensity of deformation velocity for lubricant grease]. The key to the figures on the diagrams is at the foot of p 67. In Fig 3 $\eta_1(D_1)$ is represented by the dashed-dotted line, $\eta_2(D_2)$ by the continuous line and $\eta_i(D_i)$ by the dotted line. The lines in Fig 2 are all parallel to the log D line.

Card 3/5

S/179/60/000/02/009/032
E081/E241

Flow of Anomalously Viscous Bodies Under Complex Stress Conditions

axis, and, for a given temperature, the points corres-
ponding to different conditions all lie on the same
line. Thus the effective viscosity of the residual
extract is constant, and the superposition principle
applies. Fig 3 shows that the effective viscosity of
the lubricant grease falls with increasing deformation
velocity. At 20° and 50° the effective viscosity for
axial shear is rather greater than for circumferential
shear. The differences may be interpreted as a breaking
down of the structure of the grease and the orientation
of the soap micro-filaments. The motion of the particles
in spiral flow is determined by the equations at the
foot of p 68 and the top of p 69, and Fig 4 shows the
dimensionless viscosity η_i/η_2 plotted against the
dimensionless length of the trajectory. [Fig 4
Dependence of the dimensionless viscosity η_i/η_2 on
S/L for grease at 20° and 50°] Within the limits
of experimental accuracy (5 to 10%) the points lie on
the same line for both temperatures, and the effective
viscosity is a function not only of the intensity of

Card 4/5

S/179/60/000/02/009/032
E081/E241

Flow of Anomalously Viscous Bodies Under Complex Stress Conditions

deformation velocity, but also of the dimensionless quantity characterising the trajectories of the particles. Thanks are expressed to V. P. Pavlov for participating in the discussion of results, and for valuable advice. There are 4 figures and 10 references, 8 of which are Soviet, 1 English and 1 German.

SUBMITTED: June 4, 1959

Card 5/5

S/179/60/000/03/014/039
E191/E481

/5.6000

AUTHORS: Vinogradov, G.V. and Vishnyakov, V.A. (Moscow)

TITLE: Abrasive Wear in Rolling Friction

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1960, Nr 3, pp 89-98 (USSR)

ABSTRACT: A four ball friction machine was used in the experimental study of the laws of abrasive wear of hardened steel with different lubricants under rolling friction at high contact pressures. The three lower balls remained free to roll along the groove of the supporting cup. The rolling speed of the lower balls was varied between 0.03 and 0.60 m/sec. The Hertz contact stress could reach 50000 kg/cm^2. A constant temperature of the lubricant was maintained. A high viscosity oil containing an additive with surface activity, a high viscosity non-polar oil, a low viscosity oil with 1% oleic acid, a low viscosity non-polar liquid (Cetane) and plastic lubricants, were used. Quartz dust with a micro-hardness of about 1000 kg/cm^2 served as an abrasive with particle sizes between 6 and 40 microns. By measuring the electrical resistance across the bearing

Card 1/3

S/179/60/000/03/014/039
E191/E481

Abrasive Wear in Rolling Friction

model, the conditions of lubrication were detected, With the help of a special contact in the supporting cup, the rpm of the upper ball and the rolling speed of each of the lower balls were recorded. Parallel tests were carried out with an actual ball-bearing which showed that conditions in the model were similar. The balls roll over an abrasive layer which constitutes a mixture of lubricant with abrasive. Each factor was varied singly for each set of tests. A repeatability of 10% was established. It was found that the abrasive particles are ground in the wear process down to a size equal to the depth of the projections of the rolling surfaces plus the thickness of the lubricating layer. In low viscosity liquids, a sedimentation process of the abrasive particles takes place so that the largest are deposited at the bottom of the cup outside the rolling track. Thus wear is smaller in spindle oil than in grease, although the grease possesses better lubricating properties, Lubricants thickened by the addition of high molecular weight polymers experienced in the friction machine a reduction of viscosity which shows the disintegration of

Card 2/3

S/179/60/000/03/014/039
E191/E481

Abrasive Wear in Rolling Friction

the polymer presumably by very high gradients of the
shear velocity. The same phenomenon has been found in
gearboxes. Parallel tests with a pulley mounted on
ball and roller bearings were carried out to show
similar laws of abrasive wear. There are 10 figures,
1 table and 6 references, 5 of which are Soviet and
1 English.

Card 3/3

S/152/60/000/006/001/001
B024/B076

AUTHORS: Vinogradov, G. V., Arkharova, V. V., Bezborod'ko, M. D.

TITLE: Antiwear and Antifriction Properties of Structural Group
             Fractions of Mineral Oils

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, 1960,
             No. 6, pp. 81-87

TEXT: The authors investigated how far the nature of the structural
group fractions of mineral oils affects their antiwear and antifriction
properties in the presence of oxidizing gas media. Already in previous
short time tests in the open, under seizure load conditions, with a number
of low viscosity mineral oils as well as with naphthene-paraffinic
fractions an oxidizing of the hydrocarbon medium was ascertained (Ref. 4).
Also the tests with various naphthene-paraffinic fractions in O_2 medium
(Ref. 5) showed that the oxidation process between steel and hydrocarbons
retards or interrupts the seizure of friction surfaces. The main purpose
of the present work is to ascertain, according to the results of the above

Card 1/3

Antiwear and Antifriction Properties of
Structural Group Fractions of Mineral Oils

S/152/60/000/006/001/001
B024/B076

mentioned open air tests (Ref. 1 6), what influence the fractional com-
position of mineral oils of various origins as well as the nature of gas
media exercise on the wear and friction of steel. Numerous hydrocarbon
fractions were tested and the mineral oils were classified in structural
groups according to the methods published before (Refs. 7-9). A series
of fractions were made available by M. S. Borovaya. The tests were made
on the four-ball machine; all samples tested are included in Tables 1 and
2, and the particularly typical cases are represented in Figs. 1 and 2.
(Ref. 7). In respect of the naphthene-paraffinic fractions a quality
analysis of two oil grades (Refs. 11,12) was made before and after the
tests in order to ascertain the nature of the oxidation products. The
comparison of various test results with the previous ones shows that the
total sulphur content of mineral oils is in no way characteristic of
their antiwear and antifriction properties. On the basis of tests with
oxidizing gas media it was ascertained that the nature of structural
group fractions of mineral oils was not of importance for their antiwear
and antifriction properties. Oxygen has an influence similar to that of
sulphur compounds active in relation to steel in the presence of which the
wear increases at low loads and decreases at high loads. There are 2

Card 2/3

Antiwear and Antifriction Properties of   S/152/60/000/006/001/001
Structural Group Fractions of Mineral Oils   B024/B076

figures, 2 tables, and 12 Soviet references.

ASSOCIATION: Voyennaya ordena Lenina akademiya bronetankovykh voysk im.
              I. V. Stalina (Order of Lenin Military Academy of
              Armoured Troops imeni I. V. Stalin)

SUBMITTED: December 19, 1959

Card 3/3

83687

S/152/60/000/008/004/004
B013/B054

15.6400

AUTHORS: Vinogradov, G. V., Arkharova, V. V.

TITLE: Wear-resisting and Antifriction Properties of Tetralin-
             and Decalin Homologs

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, 1960,
             No. 8, pp. 65 - 72

TEXT: In the present paper, the authors describe experiments with
Tetralin- and Decalin homologs, and study their solutions with dibenzyl
disulfide content in a concentration of 0.1 mole/l (dibenzyl disulfide
- melting point 70.5°C, sulfur content 25.9%). The polycyclic Tetralin-
and Decalin homologs used for experimental purposes were synthesized
according to Ref. 5. The hydrocarbons synthesized represented isomer
mixtures which, for simplification, are called cyclohexyl Tetralin,
dicyclohexyl Tetralin, cyclohexyl Decalin, and dicyclohexyl Decalin.
Their characteristics are given in Table 1. Figs. 1 and 2 show the re-
sults obtained from experiments with dicyclohexyl Tetralin and cyclo-
hexyl Decalin as well as their solutions with dibenzyl disulfide. The

Card 1/2

83687

Wear-resisting and Antifriction Properties of ' S/152/60/000/008/004/004
Tetralin- and Deqalin Homologs   B013/B054

wear-resisting properties of cyclohexyl Tetralin are described in Ref. 7.
This substance and its solutions with dibenzyl disulfide behave similar-
ly as is shown in Fig. 2. Dicyclohexyl Decalin and its solutions with
dibenzyl disulfide have a wear resistance similar to that of dicyclo-
hexyl Tetralin shown in Fig. 1. Table 2 gives the experimental loads.
Fig. 3 shows the time dependence of the friction coefficients. Fig. 4
shows the specific loads after one-minute experiments as a function of
the axial loads for some very typical cases. On the basis of their ex-
periments, the authors found that an increase in the oxidative activity
of the gas medium increases the chemical (oxidative) wear and the jam-
ming loads, and reduces and degenerates the jam. In hydrocarbon media,
molecular oxygen acts like an antifriction admixture. Molecular oxygen
and sulfurous antifriction admixtures increase their activity mutually.
There are 4 figures, 2 tables, and 7 Soviet references.

ASSOCIATION: Voyennaya ordena Lenina akademiya bronetankovykh voysk
               im I. V. Stalina (Military "Order of Lenin" Academy of
               the Armored Troops imeni I. V. Stalin)

SUBMITTED: January 25, 1960

Card 2/2

VINOGRADOV, G.V.; ARKHAROVA, V.V.

Basic characteristics of antiwear and antifrictional pro-
perties of hydrocarbons subjected to heavy friction. Khim.i
tekh.topl.i masel 5   no.5:45-49 My   '60. (MIRA 13:7)
        (Hydrocarbons) (Friction)

DEYNEGA, Yu.F.; DUMANSKIY, A.V.; VINOGRADOV, G.V.; PAVLOV, V.P.

Dielecectric and rheological properties of disperse plastic systems.
Koll.zhur. 22 no.1:16-22 Ja-F '60.   (MIRA 13:6)

1. Institut obshchey i neorganicheskoy khimii AN USSR, Kiyev.
          (Oils and fats)

85707

S/069/60/022/004/004/005/XX
B003/B056

54400   1274, 1333, 1263

AUTHORS: Osokina, D. N., Gzovskiy, M. V., Vinogradov, G. V., and
Pavlov, V. P.

TITLE: Investigation of the Processes of Plastic Deformation by
Means of Ethylcellulose Solutions and Gels and Optical
Polarization

PERIODICAL: Kolloidnyy zhurnal, 1960, Vol. 22, No. 4, pp. 434-442

TEXT: The investigations described in the present paper deal with the
problem as to whether it is, in principle, possible to study shear stress
and rate of deformation in plastically deformable soft bodies by the
method of optical polarization. The results obtained may be usefully ap-
plied in the mechanics of disperse systems, of tectonic physics, etc.
The measurements were carried out in a device designed by V. P. Pavlov
(Ref. 13) and constructed by the Institut fiziki Zemli AN SSSR (Institute
of Geophysics of the AS USSR), which simultaneously, fulfilled the func-
tion of a plastoviscosimeter and a dynamooptimeter. The device schemat-

Card 1/3

85707

Investigation of the Processes of Plastic   S/069/60/022/004/004/005/XX
Deformation by Means of Ethylcellulose Solu-   B003/B056
tions and Gels and Optical Polarization

ically shown in Fig. 1 and described in detail in the original paper con-
tains, among other things, a KCП-5 polariscope (KSP-5), as well as a
Berek compensator for measuring the optical effect. The dependence of
shear stress on deformation as well as the deformation-kinetic diagrams
were ascertained with the help of Pavlov's elastoplastoviscosimeter
(Ref. 14). The material used was Soviet ethylcellulose of the type K-290
(K-290) with a molecular weight of $7.7 \cdot 10^4$ and a substitution degree of
46.25%. The viscosity of a 5% alcohol benzene solution was -290 centipoise
at 20°C. The ethyl cellulose was used in a dissolved state in benzyl
alcohol (of different concentrations) and/or in benzyl alcohol dibutyl-
phthalate mixtures (whose mixing ratio was varied in a 30% concentration).
The measured results are shown in the diagrams of Figs. 2 - 5. The
modulus of shear of the ethyl cellulose solutions was between 0.01 and
1 kg/cm^2, the viscosity between 10^2 and 10^7 poise. Owing to their mechani-
cal properties, the solutions in benzyl alcohol corresponded to highly
viscous Newton liquids having a completely linear dependence of

Card 2/3

Investigation of the Processes of Plastic   S/069/60/022/004/004/005/XX
Deformation by Means of Ethylcellulose Solu-   B003/056
tions and Gels and Optical Polarization

the birefringence (Δn) both on the shear stress as also on the deforma-
tion rate. The solutions containing dibutylphthalate acquired plastical
consistence with an increase in the dibutylphthalate content. The afore-
mentioned dependences are, in this case, not linear but exponential. The
coefficient of optical activity V_τ ($V_\tau = \Delta n/\tau$; Δn - amount of the double
refraction of light, τ - shear stress) is in the case of 10 to 35% ethyl
cellulose solutions practically independent of the concentration, and is
between $5-7 \cdot 10^4$ Brewster. V_τ decreases with an increasing dibutylphthalate
content in the mixture, as well as with decreasing temperature. Among
others, a paper by G. V. Vinogradov and V. N. Manin is mentioned. There
are 5 figures, 1 table, and 13 references: 11 Soviet, 1 US, and 1 German.

ASSOCIATION: Institut fiziki emli im. O. Yu. Shmidta Moskva (Institute
            of Geophysics imeni O. Yu. Shmidt, Moscow)

SUBMITTED: April 19, 1959
Card 3/3

MDIVNISHVILI, O.M.; VINOGRADOV, G.V.; GOL'DIN, S.A.

Structure formation in suspensions of askangel and its
derivatives. Koll. zhur. 22 no. 5:606-610 S-O '60.
(MIRA 13:10)

1. Kavkazskiy institut mineral'nogo syr'ya, Tbilisi.
(Askangel)

DEYNEGA, Yu.F.; PAVLOV, V.P.; VINOGRADOV, G.V.

Instrument for a simultaneous study of dielectric and rheological properties of viscoplastic materials. Zav.lab. 26 no.3:353-356
'60.   (MIRA 13:6)

1. Institut obshchey i neorganicheskoy khimii Akademii nauk USSR.
          (Materials--Electric properties)
          (Rheology)

L 20337-63   EPF(c)/EWT(m)/BDS   AFFTC/APGC   Pr-4   BW/WW/DJ

S/2664/61/000/000/0197/0206

ACCESSION NR: AT3001990

AUTHOR: Vinogradov, G. V.

TITLE: The mechanism of the action of additives. New methods and results of an investigation of antiwear and antifriction properties of lubricating materials:

SOURCE: Prisadki k maslam i toplivam; trudy nauchno-tekhnicheskogo soveshchaniya. Moscow, Gostoptekhizdat, 1961, 197-206.

TOPIC TAGS: lubricant, lubrication, additive, oil, friction, wear, antiwear, oxidation, oxidation product, product, O, seizure, antiseizure, seizing, boundary lubrication, coefficient, boundary layer, naphthene, paraffine.

ABSTRACT: The paper describes an experimental test series intended to reveal whether or not the behavior of petroleum products under the stringent demands of boundary lubrication is primarily determined by conjoint oxidation reactions of the hydrocarbons and the steel. This would, in essence, contradict the present trend of thinking which implies that the oil is merely a carrier of additives which, through their surface activity, are adsorbed at the metal-oil boundary and are the actual source of lubrication. A new high-temperature vacuum friction-testing machine, MT-4, designed by V. I. Drandin and A. A. Konstantinov, is described.

Card 1/3

L 20337-63

ACCESSION NR: AT3001990

The tests comprised the dependence of the kinetic-friction coefficient on the axial loads in the naphthene-paraffine fraction of the MS-20 oil. The friction-vs.-time relationship at loads both below and above seizure value, and a repetition of the same tests for other oils, are described. Conclusions: (1) In the absence of O and O-containing compounds, hydrocarbon (petroleum) oils are ineffective or little-effective lubricants under boundary lubrication. (2) O and oxidation products held in solution in petroleum oils exert a highly important natural-additive effect against the seizure of steel under boundary lubrication. Even traces are effective. (3) With increasing loads on a friction couple, the relative effectiveness of boundary layers formed by organic compounds (soaps, etc.) decreases, and the effect of oxide layers increases. (4) As the oxidation process is intensified, the static friction and oxidational wear grow, but at the same time the seizing process degenerates, occurring only for short times and with relatively small increases in friction coefficient, and high-intensity seizure occurs only at very high contact stresses. Thus, every friction regime requires a specific optimal concentration of oxidants and values of the intensity of the oxidation process. (5) Since the petroleum oils serve as the carriers of O toward the steel surface, the transport conditions of the molecules of the O and the oxidation products, that is, the viscosity of the liquid lubricant, the thickness of the lubricant film, etc., are of great significance. (6) The O and oxidation products of petroleum oils act in a manner similar to that

Card 2/3

L 20337-63

ACCESSION NR: AT3001990

of S-organic compounds that are used as antiseizure additives to oils. O-rich chemical organic compounds should exert a powerful antiseizure action in the frictional wear of steels. Orig. art. has 5 figures.

ASSOCIATION: Institut neftekhimicheskogo sinteza AN SSSR (Institute of Petrochemical Synthesis, AS USSR).

SUBMITTED: 00   DATE ACQ: 23Jan63   ENCL: 00

SUB CODE: FL, CH, EL   NO REF SOV: 000   OTHER: 000

Card 3/3

89936
S/030/61/000/001/005/017
B105/B206

15.6900   1583, 1404

AUTHOR: Vinogradov, G. V., Doctor of Chemical Sciences

TITLE: New ways for testing lubricants

PERIODICAL: Vestnik Akademii nauk SSSR, no. 1, 1961, 48-53

TEXT: The following co-authors of this study are named: Ye. I. Gurovich,
N. K. Voskresenskaya (Institut obshchey i neorganicheskoy khimii
Akademii nauk SSSR (Institute of General and Inorganic Chemistry of the
Academy of Sciences USSR)), N. T. Pavlovskaya, Lyan Go-lin', Yu. Ya.
Podol'skiy, A. A. Konstantinov, and M. D. Bezborod'ko (Institut
neftekhimicheskogo sinteza Akademii nauk SSSR (Institute of Petrochemical
Synthesis of the Academy of Sciences SSSR)). The apparatus MT-4 (MT-4)
and MT-6 (MT-6) were designed at the Institute of Petrochemical
Synthesis of the Academy of Sciences USSR for studying the effect and
mode of action of the lubricants under conditions of rolling and sliding
friction. These types of friction could be studied by means of these
apparatus at temperatures of up to 800°C in the air, the presence of
various gases as well as in high vacuum. The rotary speed of one

Card 1/7

89936

S/030/61/000/001/005/017
B105/B206

New ways for testing lubricants

friction face can be varied between $1.5 \cdot 10^{-4}$ and 3200 rpm and the load on the friction face from 5 to 500 kg. This allows the conduction of experiments at contact pressures of from some kg/cm^2 up to $5 \cdot 10^4$ kg/cm^2.   ✗
Fig. 1A shows the basic diagram of the installation. The friction mechanism is shown in cross section in Fig. 1B. The temperature of the lubricants is controlled and recorded in the range of high temperatures by means of an electric potentiometer of the type ЭПВ 12-2Т (EPV12-2T). A cathode oscilloscope of the type ЭРУ (ERU) is also used. Important data were obtained in experiments with the widely used naphtha lubricants. The experiments were conducted with balls made from steel of the type ЭИ 347 (EI347) as well as hardened steel of the type ШХ9 (ShKh9). Fig. 2 shows that oxygen has a very strong effect on steel corrosion in the presence of naphtha lubricants. It was discovered previously that some liquid metals proved as being good wear-preventing agents for the friction of hardened steels. Experiments with balls from steel of the type EI347 were conducted in this connection, Wood's alloy as well as the eutectic $SnCl_2$-KCl, which melts at $224^\circ C$, having been selected as sample lubricants. The experimental results are shown in Fig. 3.

Card 2/7

89936

S/030/61/000/001/005/017
B105/B206

New ways for testing lubricants

Comprehensive studies of the lubricants show that the effectiveness of
their application for the purpose of reducing wear and friction under
severe conditions is determined by the existence of components in these
lubricants which can modify the friction face chemically. Of great
importance is also the standardization of this activity by means of
selecting suitable concentrations of components, the composition of the
gas phase as well as the conditions of supplying chemically active
agents to the friction zones. The efficiency of various lubricants may
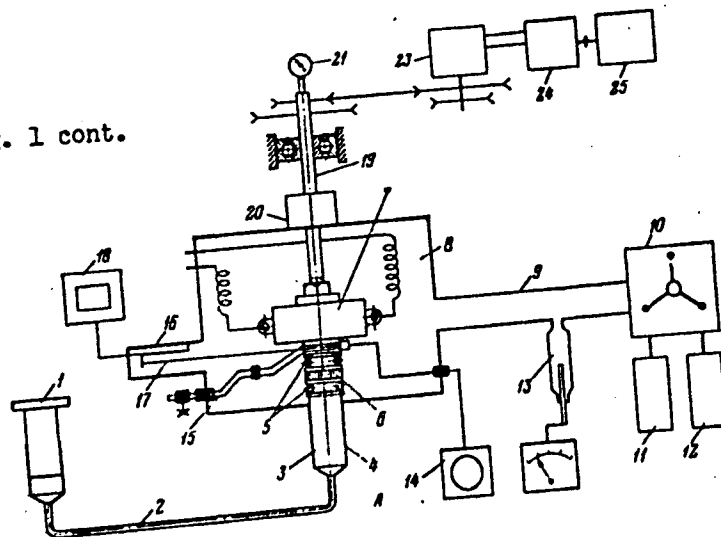still be greatly increased. There are 3 figures and 3 Soviet-bloc
references.
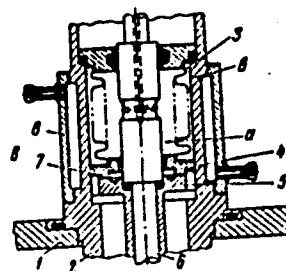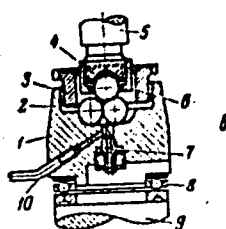
Fig. 1

Card 3/7

89936
S/030/61/000/001/005/017
B105/B206

New ways for testing lubricants

Fig. 1 cont.

Card 4/7

89936

S/030/61/000/001/005/017
B105/B206

New ways for testing lubricants

Legend to Fig. 1A.   Basic diagram of a friction testing machine for tests
at high temperatures in high vacuum, in gas media of various nature.
1) piston type manometer, 2) pipe line, 3) floating piston, 4) load
chamber, 5) ball bearing, 6) heat-insulation disc, 7) radiation furnace,
8) hermetically sealed chamber, 9) pipe line, 10) multiple cock,
11) and 12) vacuum pumps, 13) vacuum gage, 14) potentiometer of the type
ЭПВ12-2Т (EPV12-2T), 15) teflon pipe, 16) holder for the tensiometers,
17) tie rod, 18) recording device with ERU oscilloscope, 19) spindle,
20) bellows-sealed device, 21) electrotachometer, 23) hydromotor,
24) hydraulic pump, 25) electromotor.
Legend to Fig. 1B.   1) trough, 2) three balls, lockable by nut (3),
4) rotating ball on spindle (5) and nut (6), 7) bushing for thermocouple,
8) ball bearing, 9) heat-insulating disc, 10) pressed-in gas-feed pipe.
Legend to Fig. 1B.   1) chamber, 2) trough, 4) bronze ring, 5) trough,
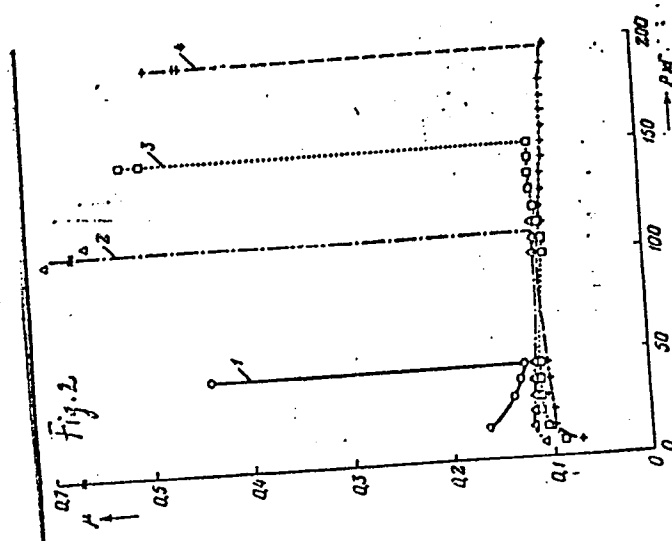6) spindle, 7) ring, 8) water jacket.

Card 5/7

89936

S/030/61/000/001/005/017
B105/B206

New ways for testing lubricants

Legend to Fig. 2. The
dynamic coefficient of
friction as a function of
the loads. 1) high
vacuum, 2) argon, 3) air,
4) bubbling of O_2 through
the lubricant.

Fig. 2.

Card 6/7

89930
S/030/61/000/001/005/017
B105/B206

New ways for testing lubricants

Legend to Fig. 3. The dynamic coefficient of friction as a function of the loads for tests with Wood's alloy as well as low-melting eutectic of salts.
1) Wood's alloy at 200°C in high vacuum,
2) eutectic KCl + SnCl$_2$ at 300°C in high vacuum,
3) ditto in air,
4) powdery eutectic at room temperature.

Fig. 3
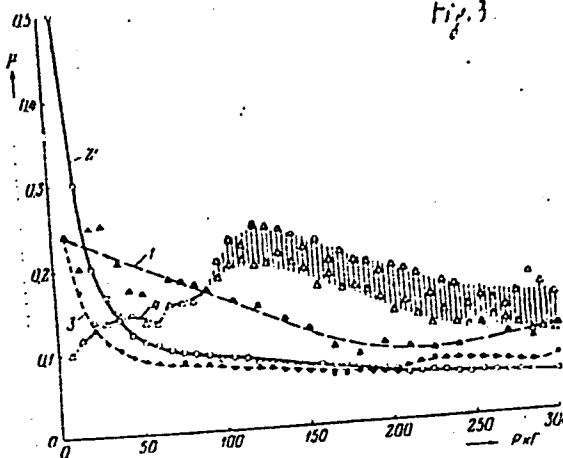
Card 7/7

88831

S/152/61/000/001/001/007
B023/B064

5.3300

AUTHORS: Vinogradov, G. V., Arkharova, V. V., Podol'skiy, Yu. Ya.

TITLE: Wear resistance and antifriction properties of alkylated aromatic hydrocarbons

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Neft' i gaz, no. 1, 1961, 61-65

TEXT: In continuation of their previous papers and published data, respectively (Refs. 1-3 and 10-13), the authors studied the antiwear- and antifriction properties of bicyclic aromatic hydrocarbons. A mixture of isomers of triisoamyl naphthalene was chosen as hydrocarbon. The investigations were carried out on a friction test machine with four balls which was described in the paper of Ref. 15. The balls consisted of ШХ6 (ShKh6) steel with a diameter of 12.7 mm. The gliding velocity was 23 cm/sec, the temperature 100°C. The experiments were conducted in air and in Ar- and O$_2$ atmosphere. Dibenzyl disulfide was used as antiwear admixture in a concentration of 0.1 mole/l. The curves of wear as a function of load showed two stages for triisoamyl naphthalene in all gas media applied. A table

Card 1/4

88831

Wear resistance and antifriction...

S/152/61/000/001/001/007
B023/B064

shows the values of the lower critical loads P_K' (on the lower stage) and the higher (P_K'' on the upper stage) at which a more or less jumpwise increase of wear occurs due to an intensive gripping. In the authors' opinion the increase of the oxidizing activity of the gas medium leads to the increase of P', to the increase of wear at $P < P'$, and to a considerable reduction of wear at $P > P_K$. The experiments with the dibenzyl sulfide solution showed, in agreement with previous publications, that the disulfide sulfur introduced into the hydrocarbon has the same effect as O_2. At lower loads, the presence of sulfur, like the presence of O_2, leads to an increase, but at high loads to a reduction of wear. Reduction is especially great when O_2 is intensively introduced into the zones of friction. The increase in the oxidizing activity of the gas medium leads to a reduction of the gripping process. The introduction of the sulfurous admixture which is active toward steel, eliminates vehement gripping. At experiments made in O_2 atmosphere, the values of the friction coefficients at the end of the 1-minute experiments did not depend on the loads perpendicular to the axis. The curves $p(P)$ for solutions of dibenzyl sulfide show, like the curves wear - load and the friction diagrams, that sulfur,

Card 2/4

88831

S/152/61/000/001/001/007
B023/B064

at friction under high specific loads acts analogously to O_2, and that each of these agents increases the effect of the other. In conclusion, the authors summarize as follows: The antiwear- and antifriction properties of the alkylated bicyclic hydrocarbons at difficult conditions of friction do not differ qualitatively from what is known about naphthene-paraffine and low-sulfuric aromatic fractions of mineral oils. These properties depend on the intensity of the course of conjugate oxidation reactions of hydrocarbon lubricating media and steel. Molecular oxygen is an active anti-aggressive admixture. Its effect increases the effect of disulfide sulfur and vice versa. K. I. Klimov and G. I. Kichkin are mentioned. There are 4 figures, 1 table, and 15 Soviet-bloc references.

ASSOCIATION: Voyennaya akademiya bronetankovykh voysk im. I. V. Stalina (Military Academy of Armored Troops imeni I. V. Stalin)

SUBMITTED: July 25, 1960

Card 3/4

88831

Wear resistance and antifriction...

S/152/61/000/001/001/007
B023/B064

Legend to the Table: 1: denotation of the product; 2: Argon; 3: Air;
4: Oxygen; 5: Triisoamyl naphthalene; 6: Dto. + dibenzyl disulfide.

1 Наименование продукта	2 Аргон				3 Воздух				4 Кислород			
	P_κ'	p'	$P_\kappa^\bullet$	p''	P_κ'	p'	$P_\kappa^\bullet$	p''	P_κ'	p'	$P_\kappa^\bullet$	p''
5 Трииэоамил-нафталин	20	120	90	30	45	127	105	32	60	120	135	70
6 То же+дибензилдисульфид	—	—	—	—	30	130	—	—	60	1C0	—	—

Card 4/4

BEZBOROD'KO, M.D.; SHABAROV, L.I.; PODOL'SKIY, Yu.Ya.; VINOGRADOV, G.V.

Instrument for investigating the wear resistance and antifriction
properties of plastics. Zav.lab. no.1:104-106 '61.   (MIRA 14:3)
(Plastics—Testing)

VINOGRADOV, G.V.; LYAN GO-LIN' [Liang Kuo-lin]; PAVLOVSKAYA, N.T.

Oxidants as a basis for the lubricating action of mineral oils.
Neftekhimiia 1 no.2:274-279 Mr-Ap '61.   (MIRA 15:2)

1. Institut neftekhimicheskogo sinteza AN SSSR.
(Mineral oils)
(Lubrication and lubricants)

VINOGRADOV, G.V.; LYAN GO-LIN' [Liang Kuo-lin]; PAVLOVSKAYA, N.T.

Higher aliphatic acids as additives to mineral oils for use
in connection with high friction of metals; use of stearic
acid. Neftekhimiia 1 no.2:280-285 Mr-Ap '61. (MIRA 15:2)

1. Institut neftekhimicheskogo sinteza AN SSSR.
                (Lubrication and lubricants—Additives)
                        (Stearic acid)

39833

S/081/62/000/011/040/057
E202/E192

11.9700

AUTHORS: Vinogradov, G.V., Liang Kuo-lin, and Pavlovskaya, N.T.

TITLE: The influence of pro- and anti-oxidants on the
             lubricating action of petroleum oils.

PERIODICAL: Referativnyy zhurnal, Khimiya, no.11, 1962, 520,
             abstract 11 M 216. (Neftekhimiya, v.1, no.3, 1961,
             427-432).

TEXT: A 4-ball friction machine was employed using an
earlier procedure (see R.Zh.Khim., 3, 1962, M218) to test paraffin
fractions of petroleum oils (NF) which did not contain additives,
and those containing 0.5% of benzyl peroxide (I) and 0.5% I +
2,6-tert-butyl-4-methylphenol (II; II as an anti-oxidant).
The tests were carried out: 1) in vacuum at approximately
10⁻⁵ mm Hg (with NF distilled in vacuum and kept without contact
with air); 2) by blowing O₂ through NF. The coefficient of
friction was determined in relation to load and the seizure load
(NZ). Introduction of I into NF caused considerable increase
of NZ in the tests carried out in vacuum, in tests with the
passage of argon, and in tests in air. In tests with the passage

Card 1/2

The influence of pro- and anti- ...   S/081/62/000/011/040/057
E202/E192

of O_2, introduction of I increased the coefficient of friction for loads lower than NZ and lowered considerably NZ; the seizure was, however, stopping rapidly during further increase of loads. Introduction of II (up to 10% concentration) into NF during the vacuum tests did not affect the results, and in tests in air and with the passage of oxygen (where a certain amount of seizure at increased loads was observed) did not influence the load causing initial seizures, but lowered the loads of the subsequent intensive seizures and the welding loads. It was concluded that II as an anti-oxidant retards the oxidation of the oil by preventing the accumulation in it of the active oxidants and thereby makes easier the appearance of intensive seizures.

[Abstractor's note: Complete translation.]

Card 2/2

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Peculiarities of the joint action of air (molecular oxygen)
and thio-, phosphorus- and chloroorganic compounds as addi-
tives to mineral oils of different viscosities. Neftekhimia
1 no.3:433-443 My-Je '61.   (MIRA 16:11)

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VINOGRADOV, G.V.; ARKHAROVA, V.V.; PODOL'SKIY, Yu.Ya.

Antiwear and antifriction properties of alkylated aromatic hydrocarbons. Izv. vys. ucheb. zav.; neft' i gaz 4 no.1:61-65 '61.
(MIRA 15:5)

1. Voyennaya akademiya bronetankovykh voysk imeni Stalina.
(Hydrocarbons)